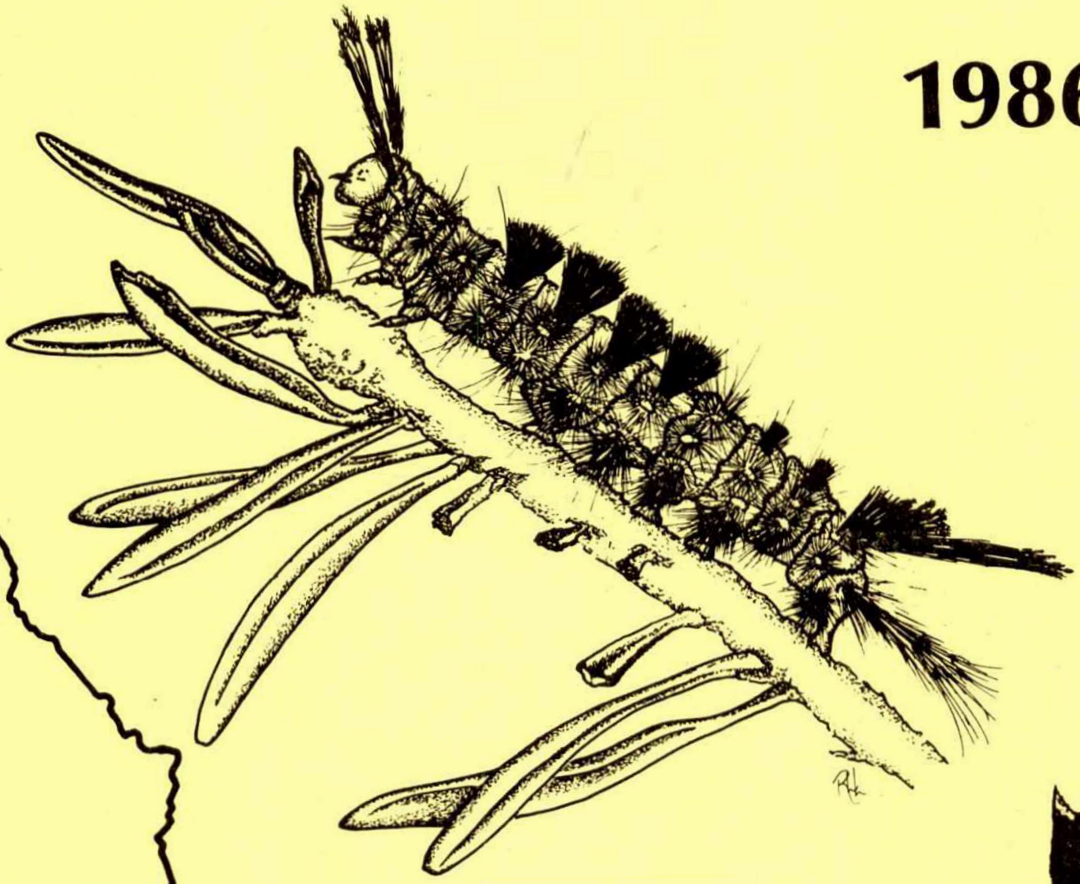
IDAHO FOREST PEST CONDITIONS & PROGRAM SUMMARY

1986



IDAHO DEPARTMENT OF LANDS

USDA FOREST SERVICE
NORTHERN AND INTERMOUNTAIN
REGIONS

Report No. 87-1

IDAHO FOREST PEST CONDITIONS AND PROGRAM SUMMARY

1986

by

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INTRODUCTION

This report summarizes the results of aerial and ground surveys and associated activities by pest management personnel within the Idaho Department of Lands (IDL) and the Northern and Intermountain Regions, USDA Forest Service, during 1986. Major insect and disease damage on forested lands of all ownerships within the State is described. Tables indicate the amount of damage. Maps show the location of major insect infestations (Appendix). Tree mortality counts in the tables are estimates. Location and trend of damage from year to year can be determined by comparing maps and mortality estimates from previous reports.

CONDITIONS IN BRIEF

In northern Idaho, acres infested by the mountain pine beetle, in all host trees, increased during 1986. Infested acres increased from just under 11,000 in 1985 to more than 15,500 in 1986. In southern Idaho, tree mortality remained constant. Mountain pine beetle killed approximately 18,000 trees each year in 1985 and 1986. Heaviest losses were in the Boise, Caribou, and Sawtooth National Forests.

Statewide, the Douglas-fir beetle has increased its activity. The principal increase has been in the National Forests of southern Idaho. An aggressive salvage and pheromone baiting program on State lands in northern Idaho has contained and reduced populations.

Spruce beetle activity continues at high levels in southern Idaho. Attacks have been found on the Nezperce National Forest in northern Idaho.

Pine engraver and fir engraver populations continued to decline in northern Idaho. In southern Idaho, pine engraver activity increased significantly.

Western spruce budworm activity in northern Idaho is variable. In one area, defoliated in 1985, tree damage declined while defoliation in other areas increased. In southern Idaho, infestations increased in size and intensity on the Boise, Caribou, Payette, Salmon, and Sawtooth National Forests.

The Douglas-fir tussock moth (DFTM) populations, building since 1981 in northern Idaho, collapsed in 1986. This resulted in the cancellation of a planned suppression project using the DFTM nucleopolyhedrosis virus. One gypsy moth adult was caught in a pheromone trap in Sandpoint, Idaho. Several ponderosa pine plantations were treated with pheromone baits to control western pine shoot borer. Several minor insect problems are discussed.

Root diseases continued to be a major concern to forest managers. Root disease evaluations include stand exams of permanent plots, native stands, and young plantations. Low-level, color-infrared photography is being used to evaluate black stain root disease near the City of Rocks, Idaho.

Fusarium root disease and other seedling diseases have been a serious problem in containerized seedling production. Seedlings are most susceptible near the end of the production cycle, when stress is used to stop growth and set buds.

Dutch elm disease killed 30 trees in Boise in 1986. Long-range plans call for replacing the elm with trees requiring less maintenance.

Decay fungi continue to cause defects in mature true fir and hemlock throughout the State, especially in overmature stands.

Elytroderma needle cast in ponderosa pine usually causes little damage. But recently, a severe outbreak developed around Little Donner Pass near Cascade. Ponderosa pine in the Idaho City area were severely damaged by a combination of Elytroderma and other needle cast fungi.

Dwarf mistletoe management in 1986 equalled nearly 100,000 acres in southern Idaho.

White pine blister rust losses have declined in recent years, but it remains a severe problem in white pine management. A western white pine management guide and a hazard rating system are being developed, using a computer model to predict survival rates.

INSECTS

Bark Beetles

Mountain Pine Beetle

In northern Idaho, the number of acres infested by mountain pine beetles increased significantly in 1986 in all host species. Acres on which the number of faded trees (those killed the preceding year) were observed increased from just below 11,000 in 1985 to more than 15,500 in 1986 (table 1). Most notable increases were in lodgepole pine stands on the West Fork Ranger District (RD), Bitterroot National Forest (NF); Red River RD, Nezperce NF; and in the Craig Mountains near Soldier's Meadows Reservoir, south of Lewiston. In the Craig Mountains, increases were noted in ponderosa pine stands. Infestations have moved from severely depleted lodgepole pine stands into other hosts. Overall increases, however, may not be as dramatic as aerial survey data had indicated. There may have been only a small increase in the number of trees killed in 1986.

A threefold increase in infested acres was noted on the West Fork RD, Nezperce NF, as beetle-caused mortality continued near Dennis Mountain. Lodgepole pine stands in that area, which is part of the River of No Return Wilderness, will likely sustain additional tree killing until most susceptible stands have been depleted.

Increased acres of infested lodgepole pine were noted during the aerial survey, on both the Red River and Elk City RD's in 1986. Subsequent ground surveys indicate infestations are static, or increasing only slightly. Beetle populations in the Red River drainage and its tributaries are expected to decrease in the next few years as a result of accelerated harvesting and host depletion.

The infestation is nearly endemic on the private lands surrounding the Louisiana-Pacific mill at Moyie Springs, Idaho. A program of rapid utilization of infested logs, preventive and suppressive pesticide treatments, sanitation logging, and stand hazard reduction has resulted in curtailment of this infestation. On nearby National Forest lands near the mill, the potential for beetle population buildups is being evaluated. Surveys were conducted in mature to overmature lodgepole pine stands to assess current beetle activity. Though extensive stands of high-hazard lodgepole pine exist on the Bonners Ferry RD, Idaho Panhandle NF's, beetle populations remain low. The greatest potential for future losses exists in stands in the Boulder Creek drainage. Timber sales planned in those stands should reduce that potential significantly.

Beetle-caused mortality observed in other areas in northern Idaho remain generally light and scattered. No major beetle outbreaks currently exist except those previously noted. A small, but persistent, infestation in lodgepole pine, covering approximately 500 acres, was observed southwest of Pinehurst.

Mountain pine beetle activity remained static in southern Idaho with approximately 18,000 "fading" lodgepole and ponderosa pines. Principle areas of infestation are near Lost Basin and Trinity Creek on the Boise NF, throughout Caribou Basin on the Caribou NF, along Squaw Creek on the Challis NF, and throughout the Big Wood River drainage and Sawtooth Valley on the Sawtooth NF. Only minimal activity was observed on the Payette, Salmon, and Targhee NF's. Specific mortality figures, summarized from aerial detection surveys, are reported in table 1.

Douglas-fir Beetle

Statewide, Douglas-fir beetle-caused mortality increased more than 1-1/2 times, going from 5,597 dead trees in 1985 to 9,382 in 1986 (table 1). The majority of this increase was in southern Idaho. In northern Idaho the combined attacks dropped slightly, declining from 4,463 in 1985, to 4,268 in 1986. However, within the northern Idaho area, beetle activity had more variation. The number of attacks dropped significantly in the Clearwater NF and the Mica State Forest Protective District. Major increases occurred on State and private lands of the Clearwater-Potlatch Forest Protective Association area near Orofino and the Maggie Creek Forest Protective District near Kamiah.

In southern Idaho, tree mortality caused by the Douglas-fir beetle increased fivefold to 5,114 trees. Beetle activity increased in all reporting areas except the Targhee NF. Activity was concentrated in the Shafer Butte area on the Boise NF, along McCoy Creek on the Caribou NF, throughout the Monroe Butte-Sturgill Peak area on the Payette NF, the South Fork of the Boise River drainage on the Sawtooth NF, and the North Fork of the Salmon River drainage on the Salmon NF. Mortality figures from aerial detection surveys are reported in table 1.

Aggressive salvage programs, coupled with the use of pheromone-baited trap trees, have been used successfully on State lands of the Clearwater and Priest Lake Administrative Areas to contain and reduce beetle populations in small mortality centers and associated windthrow. The Environmental Protection Agency now requires that pheromone tree baits be registered. Thus, use of these tree baits will be restricted to experimental projects until the registration process is complete.

Spruce Beetle

Throughout the State, the level of spruce beetle activity has not changed significantly from 1985. However, in southern Idaho spruce beetle activity is very high. Aerial and ground surveys revealed that approximately 900 mortality centers, containing almost 14,000 1985-attacked spruce trees with discolored crowns, were on the Payette and Boise NF's and adjacent State and private lands (table 1). Mortality was scattered throughout host type on the McCall, New Meadows, and Council RD's in the Payette NF, and on the Cascade RD in the Boise NF. State of Idaho lands of the Payette Lakes Administrative Area also contained a large number of mortality groups. While the large number of 1985 attacks is impressive, the complete picture can be seen only by including the equally large number of 1984 attacks and the as yet uncounted 1986 attacks.

In commercially accessible areas, aggressive salvage and trap-tree programs have minimized losses. In remote and inaccessible areas, infestations have been left untreated.

Accelerated harvest of green, high-risk stands on State lands has helped avoid losses to the various State endowments.

With the anticipated continuation of this outbreak, efforts will be continued to monitor and manage beetle populations and salvage attacked trees.

In northern Idaho, beetle activity has also increased. No attacks were found in 1985, while 228 beetle-killed trees were found in the headwaters of Newsome and Hamby Creeks, northwest of Elk City, Idaho, in 1986.

Pine Engraver

In northern Idaho, pine engraver-caused mortality continued to decline in 1986 despite a drier-than-normal spring and early summer in 1985. The number of trees killed dropped from 3,000 trees in 1985, to 1,700 in 1986. Both numbers are well below the 16,300 trees lost in 1983. Following 3 years of decline and near-normal or above-normal moisture in 1986, no major population buildups are expected in 1987.

Pine engraver activity increased significantly throughout southern Idaho with approximately 2,400 ponderosa pines killed. Activity was noted throughout Boise Basin, Buck Canyon, and Trinity Creek in the Boise NF, along Calf Pen Creek and Lick Creek in the Payette NF, on the Granite Creek drainage in the Salmon NF, and near Featherville in the Sawtooth NF. Activity remained insignificant in the Caribou, Challis, and Targhee NF's.

Fir Engraver

Fir engraver populations are found only in northern Idaho and tend to rise and fall in response to tree stress brought on by disease, drought, or other environmental factors. Approximately 1,000 fewer trees were killed in 1986 than in 1985. Tree mortality decreased except in all areas in the West St. Joe Fire Protection District, where more than three-fourths of all mortality occurred.

Western Pine Beetle

Western pine beetle activity has increased significantly throughout the Boise National Forest. Heaviest populations were in pole-sized and larger ponderosa pine stands. Areas of heavy tree mortality have been detected in the Boise Basin area near Idaho City, Idaho, and areas near Lowman, Idaho.

Table 1. Bark beetle infestations in Idaho 1985-1986.

Area	Year	MOUNTAIN PINE BEETLE Estimated mortality			DOUGLAS-FIR BEETLE Estimated mortality			SPRUCE BEETLE Estimated mortality			PINE ENGRAVER Estimated mortality			FIR ENGRAVER Estimated mortality		
		Acres Infested	Trees	MBM Volume	Acres Infested	Trees	MBM Volume	Acres Infested	Trees	MBM Volume	Acres Infested	Trees	MBM Volume	Acres Infested	Trees	MBM Volume
IPNF'S	1985	1,337	1,787	502.6	66	296	--	73	147	58.8	--	180	--	--	507	101.4
	1986	117	237	22.7	34	167	58.5	1	2	0.8	221	85	--	198	280	56.0
Clearwater	1985	--	2	0.8	--	491	--	0	0	0	0	0	0	--	1,158	231.6
NF	1986	40	35	0.7	35	165	57.7	0	0	0	0	0	0	0	0	0
Bitterroot	1985	--	2,144	--	105	247	--	0	0	0	0	0	0	0	0	0
NF	1986	3,311	5,629	452.2	272	113	26.8	10	5	1.8	0	0	0	0	0	0
Nez Perce	1985	7,041	--	--	579	1,336	467.6	0	0	0	0	0	0	--	8	1.6
NF[1]	1986	6,021	9,300	835.9	1,142	1,554	543.9	227	228	91.2	3	34	--	0	0	0
Priest	1985	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lake FPD	1986	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pend Oreille	1985	0	0	0	--	35	12.2	0	0	0	--	20	--	--	18	3.6
	1986	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mica	1985	--	10	0.8	--	482	168.7	0	0	0	--	1,809	--	--	762	152.4
FPD	1986	2	7	0.6	20	40	14.0	0	0	0	149	525	--	193	549	109.8
Cataldo	1985	--	500	45.0	--	25	8.7	0	0	0	--	15	--	--	11	2.2
FPD	1986	500	0	0	0	0	0	0	0	0	0	0	0	0	0	0
W. St. Joe	1985	0	0	0	--	581	203.3	0	0	0	--	773	--	--	2,133	426.6
FPD	1986	0	0	0	345	610	213.5	0	0	0	361	930	--	1,666	3,220	644.0
Kendrick	1985	0	0	0	150	60	21.0	0	0	0	--	301	--	--	255	51.0
FPD	1986	2	20	1.8	1	10	3.5	0	0	0	14	70	8	25	100	20.0
CPTPA	1985	--	66	26.4	--	882	308.7	0	0	0	--	7	--	--	302	60.4
	1986	4	18	9.0	298	1,228	429.8	0	0	0	0	0	0	0	0	0
Craig	1985	--	27,847	--	--	28	--	0	0	0	--	85	--	--	15	--
Mts. FPD	1986	6,637	27,275	2,450.4	22	56	19.6	0	0	0	79	91	--	0	0	0
Maggie	1985	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cr. FPD	1986	0	0	0	140	325	113.8	0	0	0	0	0	0	0	0	0
N. Idaho	1985	8,378	32,356		900	4,463		73	147		--	3,190		--	5,169	
Totals	1986	16,634	42,521		2,309	4,268		238	235		827	1,735		2,082	4,149	

Table 1. Bark beetle infestations in Idaho 1986-1986, *continued.*

Area	Year	-- MOUNTAIN PINE BEETLE -- Estimated mortality			-- DOUGLAS-FIR BEETLE -- Estimated mortality			-- SPRUCE BEETLE -- Estimated mortality			-- PINE ENGRAVER -- Estimated mortality			-- FIR ENGRAVER -- Estimated mortality		
		Acres Infested	Trees	MBM Volume	Acres Infested	Trees	MBM Volume	Acres Infested	Trees	MBM Volume	Acres Infested	Trees	MBM Volume	Acres Infested	Trees	MBM Volume
Boise	1985	6,256	4,828	308.5	275	227	32.0	55	84	33.6	270	392	19.6			
	1986	--	4,248	271.9	--	1,715	240.1	--	1,095	438.0	0	1,935	96.8			
Caribou[2]	1985	8,029	7,995	510.8	2	51	7.1	--	--	--	--	--	--			
	1986	--	4,628	296.2	--	1,415	198.1	--	35	14.0	--	--				
Challis[2]	1985	1,105	1,170	74.7	--	--	--	--	--	--	--	--	--			
	1986	--	2,494	159.6	--	--	--	--	--	--	--	--				
Payette	1985	1,084	1,090	69.9	130	189	26.6	3,881	13,775	5,510.0	--	--				
	1986	--	734	47.0	--	301	42.1	--	12,600	5,040.0	--	235	11.8			
Salmon	1985	272	381	24.3	30	42	5.9	--	--	--	113	120	6.0			
	1986	--	852	54.5	--	133	18.6	0	63	25.2	0	155	7.8			
Sawtooth	1985	2,047	2,691	171.9	145	141	19.8	--	--	--	--	--	--			
	1986	--	4,620	295.7	--	1,202	168.3	--	49	19.6	--	77	3.9			
Targhee	1985	345	482	30.8	572	484	68.2	--	--	--	--	--	--			
	1986	--	738	47.2	--	348	48.7	--	25	10.0	--	--	--			
S. Idaho	1985	19,138	18,637	1,190.9	1,154	1,134	159.6	3,936	13,859	5,543.6	383	512	25.6			
Totals	1986		18,314	1,172.1		5,114	715.9		13,867	5,546.8		2,402	120.3			
State Totals	**1985**		50,993			5,597			14,006			3,702			5,169	
	1986		60,835			9,382			14,102			4,137			4,149	

1/ Due to insufficient data in 1985, number of trees killed by the mountain pine beetle could not be estimated.

2/ Only portions of Forest flown; actual mortality figures are probably considerably higher.

Defoliators

Western Spruce Budworm

Since the million-plus-acre outbreaks of the early 1970's, only scattered budworm defoliation has been recorded in northern Idaho. The most significant change occurred in the Nez Perce NF. After only 2 years of visible defoliation, what was thought to be a building infestation died out in 1986 (table 2). Elsewhere in northern Idaho, budworm caused more than 12,000 acres of defoliation on the Bitterroot NF.

Table 2.--Acres of western spruce budworm defoliation as determined by aerial surveys in 1985 and 1986.

		Defoliation category Acres infested					
National Forest 1/	Year	Light	Moderate	Heavy	Total		Change
Bitterroot	1985	9,406	0	0	9,406		
	1986	9,434	2,880	0	12,314	+	2,908
Boise	1985	101,236	403,835	476,830	981,901		
	1986	76,875	302,216	754,614	1,133,705	+	151,804
Caribou 2/	1985	0	61,035	124,119	185,154		
	1986	47,018	141,105	88,795	276,918	+	91,764
Challis 2/	1985	46,374	39,951	13,903	100,228		
	1986	32,571	2,258	0	34,829	-	65,399
Nez Perce	1985	1,995	0	0	1,995		
	1986	0	0	0	0	-	1,995
Payette	1985	81,195	166,105	280,340	527,640		
	1986	61,768	193,957	362,550	618,275	+	90,635
Salmon	1985	14,389	0	0	14,389		
	1986	29,580	0	0	29,580	+	15,191
Sawtooth	1985	25,593	122,994	186,815	335,402		
	1986	60,667	162,788	131,336	354,791	+	19,389
Targhee	1985	55,446	79,126	341,061	475,633		
	1986	266,839	171,437	18,583	456,859	-	18,774
TOTAL	1985	335,634	873,046	1,423,068	2,631,748		
	1986	584,752	976,641	1,355,878	2,917,271	+	285,523

1/Includes State and private lands.

2/Only portion of Forest flown. Actual figures are probably much higher.

In contrast, the budworm situation is much different in southern Idaho. Defoliation in five National Forests was up more than 368,000 acres (table 2). Total for the seven forest areas in the south was nearly 3 million acres. Defoliation continued to increase in extent and intensity in the Boise, Caribou, Payette, Salmon, and Sawtooth NF's. The largest increase, 151,800 acres, was in the Boise NF, bringing this year's total in the Boise to more than 1.1 million acres. Payette and Caribou NF's outbreaks each increased by more than 90,000 acres.

The other two National Forests in southern Idaho showed declines in both extent and intensity of budworm damage. Though the Targhee NF defoliation declined nearly 19,000 acres, budworm infestation still occurs over a large area (456,000 acres). The largest decline (65,000 acres) reduced defoliation in the Challis NF to just under 35,000 acres.

Larch Casebearer

Larch casebearer infestations are very low. No defoliation was detected during1986. Close examination of western larch throughout northern Idaho revealed very few feeding or overwintering larvae. Dry conditions in the summer of 1986 caused premature needle drying and drop from larch trees with further decline in casebearer populations. This is similar to the events of approximately 12 years ago when a severe drought caused the cancellation of a planned late summer application of pesticide to control larch casebearer.

Douglas-fir Tussock Moth

In northern Idaho, the anticipated Douglas-fir tussock moth control project was canceled when the population collapsed. Surveys up to the spring of 1986 had shown increasing populations. A spray project was planned. The strategy was to treat the building population while it was still at low levels in order to prevent damage. The plan called for using TM-Biocontrol 1, the registered formulation of Douglas-fir tussock moth nucleopolyhedrosis virus. The project was planned and implemented, including development of an environmental analysis, public involvement, spray block designation, and contracting. During the spring of 1986, the ground work was completed and sampling for egg hatch and foliage development was initiated. Prespray larval sampling was initiated and a 1,930-acre block was treated. As the sampling progressed, it became apparent that the expected population was not present. While we had anticipated low tussock moth populations, the key was that if the population was increasing, as it had been observed to do during previous outbreaks--the larval counts would be much higher than observed in 1985. This did not prove to be the case. After considerable discussion, the spray application portion of the project was canceled.

No reason has been found for this population decline. In order to get a better understanding of the population trend, all planned aspects of the project sampling plan were continued. The complete results of these samples will be reported at a later date. The pheromone samples are reported in table 3. In most areas the catches were lower in 1986 than in 1985. Only 13 plots caught 25 or more moths per trap in 1986, compared to 41 in 1985, and 6 in 1984.

Table 3.--Average Douglas-fir tussock moth pheromone trap catches in Idaho, 1980-1986.

Area	No. of sample plots	Means of average moth catch per 5 traps/sample plot						
		1980	1981	1982	1983	1984	1985	1986
				STATE & PRIVATE				
Sandpoint	2	0	0	.1	0	0	0	0
Coeur d'Alene	6	0	0	1.1	3.1	4.4	8.0	7.0
Plummer-Moscow	15	0	.8	8.2	12.3	17.5	85.8	22.6
Plummer-Moscow	18	*	*	2.5	3.3	7.0	43.2	15.2
Plummer-Moscow	13	*	*	*	4.3	9.0	35.2	14.6
Plummer-Moscow	1	*	*	*	*	36.4	68.4	42.8
Plummer-Moscow	2	*	*	*	*	*	76.0	49.7
Craig Mountains	7	*	2.7	.5	.5	.6	?	
Plummer-Moscow	3	*	*	8	8	8	8	80.5
				NEZ PERCE NF				
Selway RD	4	.2	1.2	.7	.1	.1		
Slate Creek RD	5	0	1.6	2.8	.6	1.4		
Slate Creek RD	6	*	*	1.3	.3	0		
Elk City RD	3	*	*	.3	.1	0		
Red River RD	2	*	*	0	0	0		
Clearwater RD	1	0	0	0	0	0		
Clearwater RD	6	*	*	.6	.6	.3		
				CLEARWATER NF				
Lochsa RD	5	*	3.6	.2	0	0		
Canyon RD	8	*	*	8.7	*	*		
Pierce RD	18	*	*	.3	.1	.1		
Potlatch RD	8	*	*	1.8	4.5	13.0		
Powell RD	8	*	*	.3	.1	0		
				BOISE NF				
Cascade RD	2 (1 in 86)	*	.1	.3	20	0	1.0	1.2
Mountain Home RD	2 (1 in 86)	*	*	.3	21.7	.4	0	1.2
				PAYETTE NF				
Council RD	2 (5 in 86)	*	*	43.3	38.2	6.7	5.1	21.2
McCall RD	1	*	0	.6	11.0	.5	*	*
Weiser RD	3 (5 in 86)	*	*	43.3	42.1	8.1	4.1	15.2

Table 3.--Average Douglas-fir tussock moth pheromone trap catches in Idaho, 1980-1986, *continued*

Area	No. of sample plots	Means of average moth catch per 5 traps/sample plot						
		1980	1981	1982	1983	1984	1985	1986
				SALMON NF				
Cobalt RD	2	*	*	0	2.6	0	*	*
North Fork RD	2	*	*	11.4	38.7	1.9	*	6.6
				SAWTOOTH NF				
Burley RD	1	*	*	*	*	.2	*	*
Fairfield RD	3 (2 in 86)	*	1.6	5.2	20.3	6.3	0	19.7
Ketchum RD	1	*	*	2.6	14.8	.8	*	*
				OTHER FEDERAL				
Owyhee Mountains	2 (4 in 86)	27.8	55.8	*	*	10.8	.6	9.4

* Blanks indicate no traps were deployed

During the aerial survey, areas showing DFTM-caused defoliation were observed outside the planned spray area. All defoliation was at low elevations--often intermingled with or close to agricultural areas. Total defoliation covered approximately 3,385 acres. One area was in Deep Creek on the south side of Skyline Drive, but the majority of the defoliation was between Harvard and Deary (fig. 1).

Defoliation by this insect was not detected in southern Idaho. However, tussock moths were found in pheromone-baited detection traps placed on the Boise, Payette, and Sawtooth NF's, State and BLM lands around Bellevue, Idaho, and in the Owyhee Mountains of southwestern Idaho. Trapping results indicated increasing populations on the Payette NF and throughout the Owyhee Mountains. Elsewhere, populations remained static or declining. Trap catch information is reported in table 3.

Western Pine Shoot Borer

From 1981 through 1985, pheromone-impregnated plastic strips were used to reduce mating success and subsequent population levels in several ponderosa pine plantations in northern Idaho. Results have been satisfactory at each plantation except at Meadow Creek, in the Nez Perce NF. It is suspected that adjacent host stands provided many moths that reinfested the plantation. Meadow Creek was dropped from the control program in 1986. With terminal damage at a low level, another 5-year program was initiated in 1986 to maintain shoot borer populations at their current level. Once again, in a mating-confusion tactic, pheromone-impregnated plastic strips were deployed throughout selected plantations of the Inland Empire Tree Improvement Cooperative. The sex-attractant dosage was deployed at 8.6 grams per acre on strips placed in a 30- by 30-foot spacing. Effects of the treatments, measured by counting infested terminals, are shown in table 4.

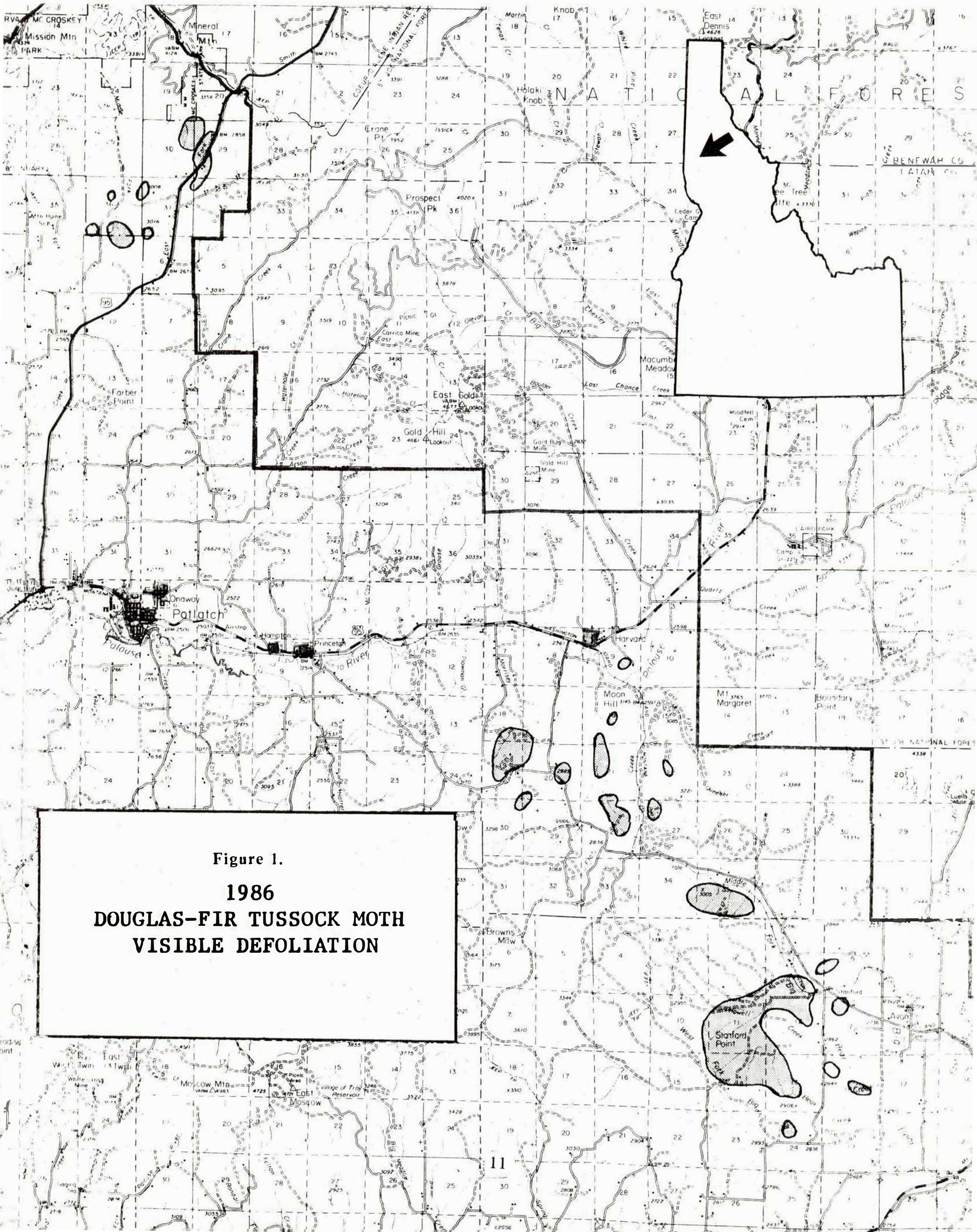

Figure 1.

1986

DOUGLAS-FIR TUSSOCK MOTH VISIBLE DEFOLIATION

Table 4.--Effects of pheromone treatments on western pine shoot borers infesting ponderosa pines - 1986.

		Infested terminals (percent)		
Plantation 1/	Treated	Pretreatment	Posttreatment	Change
Lone Mountain	Treated	14	9	5
	Check	42	33	9
Tensed	Treated	6	6	None
	Check	42	23	19
Russell Bar	Treated	6.0	7.5	1.5

1/Last year Meadow Creek was incorrectly reported to have a posttreatment infestation rate of 19 percent. The correct figure was 30.3 percent.

Gypsy Moth

One male gypsy moth was found in a pheromone-baited survey trap in Sandpoint, Idaho in 1986. Idaho has now joined Washington, Oregon, California, Wyoming, and Montana in the list of western States where gypsy moths have been found. With only one captured moth, it is very unlikely an established population exists at this site, but the survey will expand in this area in 1987.

Gypsy moth surveys are being coordinated by the Idaho Department of Agriculture in cooperation with the Idaho Department of Lands and Regions 1 and 4, USDA Forest Service. In northern Idaho, 94 traps were placed at 26 sites. In southern Idaho 76 sites were monitored. No other moths were caught in 1986.

Figure 2. Gypsy moth caught in pheromone trap.

Sugar Pine Tortrix and Pine Needle Sheathminer

Isolated small infestations continue to occur along the Big Hole Mountains in lodgepole pine in the Targhee NF.

Pine Butterfly

Pine butterfly defoliation was not observed in Idaho. But small numbers of adults were observed in many ponderosa pine stands.

Minor Insects

Gouty Pitch Midge

Again in 1986, as in 1985, the gouty pitch midge caused considerable damage to ponderosa pines in northern Idaho, Coeur d'Alene to Sandpoint. Some stands were so heavily damaged and weakened that buprestid and cerambycid wood borers attacked and killed weakened trees. The gouty pitch midge alone has killed an occasional tree.

Figure 3. Gouty pitch midge damage on ponderosa pine.

Hemlock Sawfly

The sawfly outbreak, discovered in 1985 defoliating hemlock in the extreme northern end of the State near Priest Lake, persisted through 1986. Aerially visible defoliation

covered approximately 19,250 acres despite inability to find an overwintering egg population. Two ground surveys were conducted at different times during the summer. Very heavy feeding and a large larval population were found during the first survey. The second survey conducted during the last week of July showed very few live larvae, many dead and diseased larvae, and very few cocoons compared to the number found in late summer of 1985. Some trees, heavily defoliated in 1985, now have dead tops.

Cranberry Girdler Moth

Cranberry girdler moth damage was detected in bareroot seedlings at the Coeur d'Alene Nursery in 1980. Pheromone-baited traps and chemical treatments were used in monitoring insect populations and reducing damage to a very low level. Low trap counts in 1985 and 1986 lead to a single treatment of Dursban 4E each year. During the 1985 lifting period, more than 2,700 seedlings were examined. No damage was detected.

During the 1986 lift, 0.2 percent of 4,067 western larch, 2.7 percent of 3,234 3-0 Douglas-fir, and 0.7 percent of 17,548 2-0 Douglas-fir showed girdler damage. Pheromone trapping will continue in 1987 with chemical treatments as needed.

Douglas-fir Needle Midge

Douglas-fir needle midge damage was again noted in 1982 in the Palouse area of northern Idaho. Damage peaked in 1985; in 1986 no needle damage was seen.

Balsam Woolly Adelgid

Balsam woolly adelgid infestations have persisted through 1986. While we are not aware of any extension of the infestation into new areas, populations have increased within some of the sites. At one location--a frost pocket patch of subalpine fir on the south side of State Highway 8, approximately halfway between Troy and Deary in Latah County--only one tree was found with adelgids in 1983. In 1986, 84 percent of the trees in the area were infested. Surveys will continue in 1987. An impact report based on a survey in the fall of 1985 is now in preparation.

Cone and Seed Insects

Cooperative Forestry and Pest Management, Missoula, Montana, in cooperation with the Intermountain Forest and Range Experiment Station, Ogden, Utah, treated 10 western larch trees with Acecap® implants at a study site in northern Idaho. The objective was to protect developing conelets from insect damage. Before the sample collections were made, an early spring frost caused the entire crop to abort. Treatment is rescheduled for April 1987.

Cone moth and cone worm populations were down from last year in western white pine trees at the Moscow Arboretum. However, an increase in seed bug activity triggered a midseason fenvalerate (Pydrin®) treatment. The cone harvest yielded 125 bushels from which 36 pounds of seed were extracted. Estimates for the 1987 crop are 1,000 bushels. Insect populations are to be monitored again with pheromone traps.

Cone production at the western white pine seed orchard in Coeur d'Alene, Idaho, was the lowest in several years. Even though the current cone crop size did not warrant chemical treatment, an early application (May 31, 1986) was used to reduce damage to the cone flowers of next year's crop. Adjacent ponderosa pine stands reinfested large population reservoir of seed bugs that enter the orchard each spring. Without treatment, damage to the first-year cones can be very high.

Locust Borer

Of the 1,800 street-side black locust trees in Boise, more than 450 were killed by the locust borer. Beetles have been extremely active in the city in the past 2 years, killing hundreds of black locusts along streets, ditch banks, and canals.

Scarab Beetle

A scarab beetle, tentatively identifed as *Dichelonyx backi*, defoliated new growth of scattered lodgepole pines in stands on the Targhee NF. Defoliation was most evident within young stands; feeding was also detected on mature trees.

Spruce Bud Scale

Spruce bud scales have been detected on ornamental spruces scattered throughout southern Idaho. Heavy infestations of this scale have caused partial defoliation of its favored host, Norway spruce, in Boise.

DISEASES

Nursery Diseases

Fusarium Root Disease

Fusarium root disease is one of the major problems of containerized seedling production in northern Idaho forest tree nurseries. It is most serious in Douglas-fir. Most conifer species are affected to some degree. Recent investigations into the epidemiology of this disease indicate that although much inoculum is seedborne, other sources of inoculum may be important including weeds in and near greenhouses and containers. Also, many seedlings which lack root disease symptoms become infected at various times throughout the growth cycle. Fungicide treatments are often ineffective. Damage most often appears toward the end of the production cycle when seedlings are stressed to stop growth and set buds.

Fusarium root disease was also important in bareroot Colorado blue spruce seedlings at a nursery near Bonners Ferry. The disease was causing regular root disease pockets but was adequately controlled with fungicide drenches.

Figure 4. Fusarium oxysporum caused root disease in bareroot Colorado blue spruce.

Grey Mold

Grey mold continues to be a problem for containerized seedlings, particularly western larch and Engelmann spruce. However, the disease also caused damage in bareroot grand fir seedlings at a nursery near Bonners Ferry. In the bareroot situation, the disease was most common in portions of very dense beds that prevented seedling foliage from adequately drying out out. Fungicide applications have generally been ineffective.

Meria Needle Cast

Growers at the USDA Forest Service Nursery in Coeur d'Alene continued to apply preventive fungicides to control Meria needle cast of bareroot western larch. The disease was not commonly encountered during 1986 because of control efforts and nonconducive weather conditions.

Sirococcus Tip Blight

This disease continues to cause some losses to containerized Engelmann spruce and bareroot ponderosa pine and Engelmann spruce seedlings at several nurseries in northern Idaho. Damage during 1986 was most apparent on bareroot Engelmann spruce at a nursery near Bonners Ferry. Tips of 2-0 seedlings were blighted. There was little mortality associated with the disease.

Diplodia Tip Blight

This disease is a continuing problem at one nursery east of Lewiston. The disease was most common on 1-0 ponderosa pine. The levels of damage were related to spring weather conditions. When wet condtions prevail throughout the spring and early summer, disease levels can be extensive.

Phoma Blight

Relatively small losses were encountered with this disease during 1986. The pathogen caused mostly tip blight and dieback of pine seedlings randomly through the beds.

Pythium Root Disease

Pythium root disease was especially severe on bareroot dogwood seedlings at a nursery near Bonners Ferry. Large pockets of disease were evident. Damage was related to soils with poor drainage and excessive water applied to the crop. Fungicides were ineffective in controlling the disease. *Pythium* spp. were also commonly associated with western white pine seed collected from the Moscow Arboretum. Some of the seed had very poor germination. This may have been related to extensive colonization by these organisms.

Weather Damage

Temperatures changed dramatically during May 1986, from rather cool to very warm during a short period of time. As a result, many young seedlings, particularly those grown in containers, were damaged by excessive heat. The temperature changes occurred at a time when seedlings had recently emerged and were most vulnerable to damage. Western larch and western redcedar were especially vulnerable.

Soil Fumigation

Evaluation of the efficacy of Basimid® Granular as an alternative to methyl bromide/chloropicrin, for soil fumigation begun in 1986 at the USDA Forest Service Nursery in Coeur d'Alene. Effects on soil pathogen populations, seedling establishment, and growth are being evaluated.

Decays

Indian paint fungus is the major cause of defect in mature true fir and hemlock throughout the State, especially in overmature stands. Shorter rotations and logging practices that minimize wounding can reduce losses.

Red ring rot is widespread in pines, larch, Douglas-fir, and spruce in Idaho. The amount of damage varies widely throughout the State.

Aspen canker and trunk rot can be found in most aspen stands throughout Idaho. It is especially damaging in older stands.

Stem Wilts

Dutch Elm Disease

The city of Boise has a street-tree population of about 2,100 elm trees. In 1986, 30 trees succumbed to Dutch elm disease. The long-range plan for the city is to replace elms with trees requiring less maintenance.

Abiotic Problems

Hail Damage

A severe spring hailstorm stripped the foliage and buds off the southeastern side of Douglas-fir in a 200-acre stand in the Brownlee Creek drainage about 15 miles northwest of Cambridge.

Blowdown

An intense spring windstorm uprooted and snapped off large-diameter trees on approximately 2,000 acres within Steep Creek, Five Mile Creek, and Rock Creek on the Boise NF. More than 15 MMBF of volume has been salvaged from these areas.

Root Diseases

Root diseases continued to be a major concern to foresters. Considerable field time was spent examining and evaluating stands for root disease problems. A typical case of root disease losses was a timber stand near Round Lake State Park where the best trees were marked for reserve 3 years ago. Many of these trees are now dead or dying. Many adjacent unmarked trees are dead and dying. For the past 5 years, the IDL has closely monitored a total of 112 trees in 15 root disease pockets scattered throughout northern Idaho. Nearly all of these trees exhibited root disease symptoms in 1981. Since then, 74 (66 percent) of these trees have died. Most of the rest of these trees are exhibiting more advanced symptoms. Many trees, in a 1/20-acre plot established around each of the pockets, have also died or are exhibiting an increase in symptoms. Most plots only have a few remaining live trees and have lost 10 to 20 trees to root disease over the past 10 years. The 5-year monitoring data will be compiled to provide volume loss estimates for the sites.

To monitor root disease activity in young plantations, a series of permanent plots have been established in plantations of different species. The IDL is cooperating in one set of ponderosa pine plots in the Rathdrum Flats area where thousands of acres of lodgepole pine are being converted to ponderosa pine. Many of these plantations have suffered sporadic losses to Armillaria root disease and are now being precommerically thinned. Plots were established last year to monitor both thinned and unthinned areas for evidence of root disease. Similar plots, in 23 other plantations, were reexamined 2 to 3 years following establishment. Annual mortality rates of 1.8-4.2 percent occurred in root disease portions of these stands.

Plots established in 1974, in four stands in the Lonesome Creek drainage, Fernan Ranger District, Idaho Panhandle National Forests, were reexamined in 1986. Preliminary analysis of data from these 100-year-old stands indicated:

1. Average annual mortality for the 12-year period was 4.1 trees/acre (3.1 percent of the trees/year). Of this mortality, 3.3 trees/acre were attributed to root diseases.

2. Root diseases killed 43 percent of the Douglas-fir stems, accounting for 41 percent of the volume, during the 12-year period. For grand fir, 27 percent of the stems were killed, for 26 percent of the volume.

3. Stand growth was more than offset by mortality during the 12 years. The stands averaged 13 percent less volume in 1986 than in 1974.

Problems associated with annosus root disease, tomentosus root disease, Schweinitzii butt rot, and black stain root disease occurred in portions of southern Idaho. Douglas-fir suffered the most damage. Black stain root disease occurred most often in pinyon pine. A project to determine extent of infection centers caused by black stain root disease--using color-infrared, low level photography--is currently underway near City of Rocks, Idaho.

Foliage Diseases

Ponderosa Pine Needle Cast

Several different fungi attack ponderosa pine needles. The identity of causal organisms is often unknown. Several different fungi may be involved in "grey beard," a needle disease that kills the foliage but the needles are not shed. The dead needles hang down from the branches and fade to a grey color. This disease fluctuates widely in intensity through most of the ponderosa pine range in Idaho. It is especially prevalent in the Idaho City area.

Elytroderma needle cast can be found throughout the ponderosa pine range, but it generally causes little damage. However, during the last few years there has been a severe outbreak in ponderosa pine around Little Donner Pass near Cascade. For several years, many trees in this area have been infested by defoliating insects as well as needle diseases. Some trees have been killed by bark beetles.

There seems to be a wide range of susceptibility by individual trees because healthy-appearing trees are found growing next to severely infected trees. During the spring of 1985, permanent plots were established in the Little Donner Pass and Idaho City areas to monitor damage on 33 trees exhibiting various levels of infection. Several individual branches were also tagged to more closely follow disease activity. The trees will be monitored to determine if the infected trees recover.

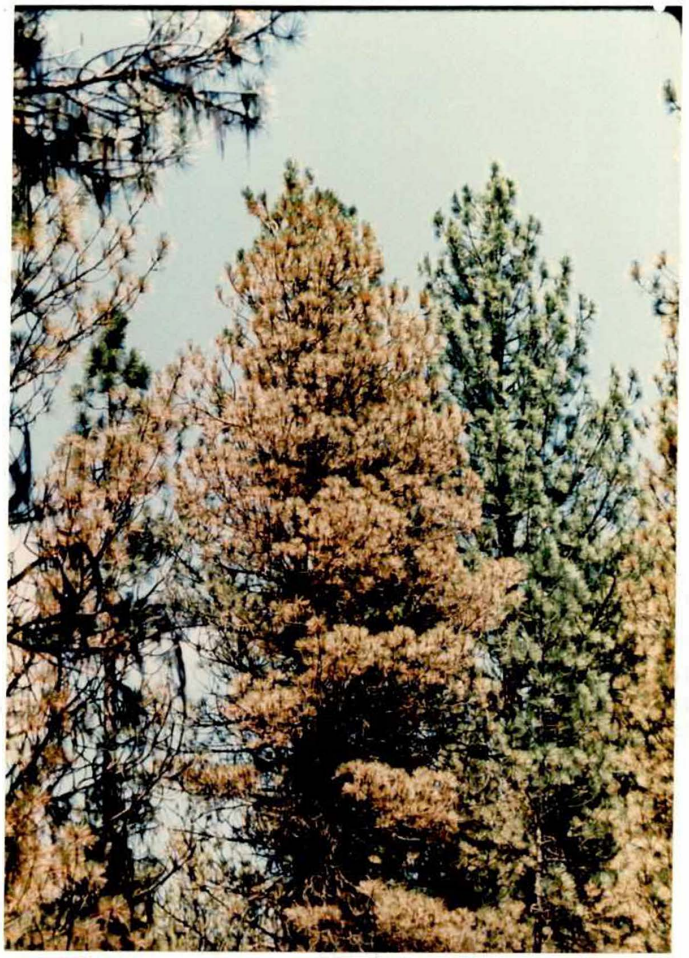

Figure 5. Elytroderma needle cast of ponderosa pine near Idaho City, Idaho.

Larch Foliage Diseases

Larch foliage diseases continue at very low levels this past year. This is probably due to the dry weather conditions.

Douglas-fir Foliage Diseases

Two major needle diseases of Douglas-fir occurred throughout the range of Douglas-fir in the State. Rhabdocline, which causes brown mottling of the needles prior to death, is more frequent in the southern portion of the State and continues at epidemic proportions in some eastern Idaho stands. In portions of southern Idaho, damage is often masked by spruce budworm defoliation. Swiss needle cast was more frequent in the northern portion of the State where it is widespread. Most stands are only lightly infected.

Marssonina Blight

This disease occasionally infects aspen foliage throughout the aspen range in southern Idaho. It is often associated with aspen leaf miner.

Stem and Branch Diseases

Dwarf Mistletoes

Dwarf mistletoes attack most conifer species throughout Idaho. Severe infections can reduce tree growth, wood quality, and cone crops, and may predispose trees to attack by other agents. Dwarf mistletoe management considerations were incorporated into many long-range timber management plans and silvicultural prescriptions throughout the State. Concurrently, dwarf mistletoe suppression projects were conducted to clean up the diminishing acreage of previously harvested stands in which infected trees were left and now overtop established regeneration. The dwarf mistletoe management program is a sequential process of education, pre-suppression survey, evaluation, control, and post-control evaluation. Accomplishments for 1986 for southern Idaho National Forests are reported in table 5.

Table 5.--Dwarf mistletoe accomplishments, southern Idaho, 1986

National Forest	Presuppression survey acres	Suppression project acres	Postsuppression evaluation acres
Boise	44,872	509	300
Caribou	12,000	210	250
Challis	1,667	32	58
Payette	20,204	254	641
Salmon	13,783	133	0
Sawtooth	77	78	78
Targhee	753	1,293	430
TOTAL	93,356	2,509	757

Douglas-fir dwarf mistletoe was noted for the first time in the Owyhee Mountains, about a mile north of Silver City, Idaho.

Stem Cankers

White Pine Blister Rust

Occurrence of white pine blister rust remains a severe handicap in managing western white pine throughout northern Idaho. Losses from the disease have declined over the past few years as harvested stands have been regenerated with more resistant white pine stock and mixtures of other species. A guide for managing western white pine in the presence of blister rust is being compiled by CFPM, Intermountain Station, and the Clearwater National Forest. In this guide, infection levels and prevalence of *Ribes* will be used to assess site hazards. The guide will use computer models to predict rates of white pine survival in sites with different hazards. Site hazards and infection levels will be used to develop alternatives for intermediate treatments and site regeneration.

Pinyon Blister Rust

This blister rust, which causes a stem canker, was noted for the first time on pinyon pine in Idaho in the Albion Mountains north of the Idaho/Utah border.

Miscellaneous Stem Cankers

Stalactiform rust is a serious problem in dense stands of lodgepole pine in central and southern Idaho. Comandra blister rust infections occurred infrequently on lodgepole pine in southeastern Idaho. Infections on ponderosa pine were also found infrequently across southern Idaho. Cytospora stem cankers were common throughout the range of aspen in southern Idaho.

COOPERATIVE TRAINING

The Idaho Department of Lands, Intermountain Region, and Northern Region continued a cooperative training program in 1986. Formal training sessions are designed for basic field identification of forest pests and for stand and pest management alternatives. Trainees come from both state and federal land management agencies and include stand exam crews, silviculturists, and forest managers. Informal sessions were organized for a group of interested contractors and a representative from the Mexican Forest Service.

Formal sessions are planned for Sandpoint, St. Maries, St. Anthony, Idaho, and Logan, Utah, in 1987.

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INDEX OF INSECTS AND DISEASES

Insects

Common Name	Scientific Name
Balsam woolly adelgid	*Adelges picea* (Ratzburg)
Cone moth	*Eucosma recissoriana* Heinrich.
Cone worm	*Dioryctria abietivorella* (Grote')
Cranberry girdler moth	*Chrysoteuchia topiaria* (Zeller)
Douglas-fir beetle	*Dendroctonus pseudotsugae* Hopk.
Douglas-fir needle midge	*Cortarinia* sp.
Douglas-fir tussock moth	*Orgyia pseudotsugata* McDunnough
Fir engraver	*Scolytus ventralis* LeConte
Gouty Pitch midge	*Cecidomyia piniiopsis* O. S.
Gypsy moth	*Lymantria dispar* (L.)
Hemlock sawfly	*Neodiprion tsugae* Middleton
Larch casebearer	*Coleophora laricella* (Hub.)
Locust borer	*Megacyllene robiniae* (Foster)
Mountain pine beetle	*Dendroctonus ponderosae* Hopk.
Pine butterfly	*Neophasia menapia* (Felder & Felder)
Pine engraver	*Ips pini* (Say)
Pine needle sheathminer	*Zelleria haimbachi* Busck.
Scarab beetle	*Dichelonyx backi* (Kirby)
Spruce beetle	*Dendroctonus rufipennis* (Kirby)
Spruce bud scale	*Physokermes piceae* (Schrank)
Sugar pine tortrix	*Choristoneura lambertiana* (Busck)
Western pine beetle	*Dendroctonus brevicomis* LeConte
Western pine shoot borer	*Eucosma sonomana* Kearfott
Western spruce budworm	*Choristoneura occidentalis* Freeman

INDEX OF INSECTS AND DISEASES

Diseases

Common Name	Scientific Name
Annosus root disease	*Heterobasidion annosum* (Fr.) Bref.
Armillaria root disease	*Armillaria ostoyae* (Romagn.) Herink
Aspen canker	*Valsa sordida* Nits.
Aspen trunk rot	*Phellimus tremulae* (Bond) Bond & Boriss
Atropellis canker	*Atropellis piniphila* (Weir) Lohm. & Cash
Black stain root disease	*Leptographium* spp.
Brown cubical butt rot	*Phaeolus schweinitzii* (Fr.) Pat.
Comandra rust	*Cronartium comandrae* Peck.
Diplodia tip blight	*Diplodia pinea* (Desm.) Kickx.
Dothistroma needle blight	*Scirrhia pini* Funk & Park.
Dutch elm disease	*Ceratocystis ulmi* (Buism.) C. Mor.
Dwarf mistletoes	*Arceuthobium* spp.
Elytroderma needle cast	*Elytroderma deformans* (Weir) Darker
Fir broom rust	*Melampsorella caryophyllacearum* Schroet.
Fir needle cast	*Lirula* spp.
Fir needle rust	*Pucciniastrum* spp.
Fusarium root disease	*Fusarium oxysporum* Schlect.
Grey mold	*Botrytis cinerea* Pers. ex Fr.
Indian paint fungus	*Echinodontium tinctorium* (Ell. & Ev.) Ell. & Ev.
Ink spot of aspen	*Cibornia* (*Sclerotinia*) *bifrons* (Whetz.) Whetz.
Laminated root rot	*Phellinus weirii* (Murr.) Gilb.
Lodgepole pine needle cast	*Lophodermella concolor* (Dearn.) Darker
Marssonina blight	*Marssonina populi* (Lib.) Magn.
Meria needle cast	*Meria laricis* Vuill.

Diseases, *continued*

Common Name	Scientific Name
Phoma blight	*Phoma eupyrena* Sacc.; *Phoma pomerum* Thuem.; *Phoma glomerata* (Cda) Wr. & Hochapf.
Poplar shoot blight	*Venturia macularis* (Fr.) Mull. & Ark
Red band needle blight	*Scirrhia pini* (Funk & Park.)
Red ring rot	*Phellinus pini* Pilat. (=*Fomes pini* (Thore) (Lloyd))
Rhabdocline needle cast	*Rhabdocline pseudotsugae* Syd.
Septoria leaf spot & canker	*Septoria* sp.
Sirococcus tip blight	*Sirococcus strobilinus* Preuss.
Stalactiform rust canker	*Peridermium stalactiforme* Arth. & Kern (=*Cronartium coleosporioides* Arth.)
Swiss needle cast	*Phaeocryptopus gaumanni* (Rhode) Petr.
Tomentosus root disease	*Inonotus tomentosus* (Fr.) Gilb.
Western gall rust	*Endocronartium harknessii* (Moore) Hirat.
Western pine-aster rust	*Colesporium asterum* (Diet.) Syd.
White pine blister rust	*Cronartium ribicola* Fisch.

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APPENDIX

DOUGLAS-FIR BEETLE
MOUNTAIN PINE BEETLE
PINE ENGRAVER BEETLE
SPRUCE BEETLE

1986

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

STATE OF IDAHO

Scale 1:1,000,000
1 inch equals approximately 16 miles

FIR ENGRAVER BEETLE
WESTERN SPRUCE BUDWORM
DOUGLAS-FIR TUSSOCK MOTH
HEMLOCK SAWFLY

1986